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Investigating Individual Differences in Action-Based Decision-Making

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INVESTIGATING INDIVIDUAL DIFFERENCES IN ACTION-BASED DECISION-MAKING

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ABSTRACT

During high-stakes or high-threat situations, decisions must be made very quickly. Certain situational and individual difference factors can have an impact on decision-making under threat. In terms of situational effects, prior research demonstrates that threats that are perceived as farther away may allow for behavioral inhibition. Moreover, individual differences, such as low trait neuroticism and effective coping strategies, may play a mitigating role in the experience of threat, thereby increasing the likelihood of responding adaptively to the situation instead of being reactive. Consequently, the purpose of this study was to examine whether specific factors, including situational reappraisal, changes in target distance, and individual differences in coping and trait neuroticism, influence action-based decision-making in high-threat situations. Action-based decision-making under threat was assessed through the decision to shoot or not shoot a target based on whether or not it was armed. An opportunity for reappraisal was presented with the target changing or staying the same distance. Individual differences examined included neuroticism and coping strategies. The opportunity for reappraisal did not increase decision accuracy. However, reappraisal as a coping strategy was useful in decision accuracy. Increasing the distance of the target during reappraisal also was useful in decision accuracy. Neuroticism, on the other hand, was not a significant predictor of performance. The results from this study may have implications regarding the usefulness of coping strategies in aiding decision-making under high-stakes situations versus the influence of ingrained individual characteristics and the opportunity for reappraisal.

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INTRODUCTION

<u>Section 1:</u> Overview

Certain occupations require quick life and death decisions. This type of decision is pertinent to, for example, members of law enforcement and the military who have to decide whether or not to use lethal force on another human being. Unfortunately, making this decision is very difficult and has resulted in many situations where an unarmed person or non-enemy was killed. Threat perception is crucial to such situations. In order to decide whether or not to shoot, an individual has to appraise the situation and decide whether or not a threat is truly present. This study examines how action-based decision-making is affected by appraisal, re-evaluation of the situation, and psychological factors during threat.

<u>Section 2:</u> Emotion's Effects on Perception

Initial appraisal, re-evaluation, and subsequent decision-making are influenced by changes in perception caused by psychological state. An abundance of research suggests that emotion can influence one's perception. According to the *circumplex model*, emotions can be understood as falling within the polarized dimensions of arousal (high to low) and valence (pleasure-displeasure) as degrees on a circle (Russell, 1980). Positive valence is associated with increased perception of a situation as an opportunity, rather than a danger (Tamir & Robinson, 2007). Negative valence stimuli are perceived as larger than positive or neutral stimuli (van Ulzen, Semin, Oudejans, & Beek, 2008). These effects can be explained, in part, by the *affect-as-information hypothesis*, which proposes that emotion can convey motivating information about a situation (Schwarz &

Clore, 1983). Such information includes potential costs and benefits of taking action, which can prompt rapid, automatic responses without thoughtfully considering the consequences of such actions (Hogarth et al., 2011). Thus, the effect of emotion on perception can be adaptive by motivating efficient actions and minimizing potentially dangerous actions. For example, negative valence and high arousal states such as feeling threatened are associated with increased risk perception (Hogarth et al., 2011) which may motivate the individual to react in a way to minimize the risk of harm. Feeling threatened can also influence the perception of a stimulus' characteristics. According to the *threat-signal hypothesis,* a threatening stimulus tends to be misperceived as being closer in proximity than a nonthreatening stimulus. For example, feeling threatened by the presence of a tarantula makes it seem closer (Cole, Balcetis, & Dunning, 2013). Similarly, stimuli that are perceived as threatening appear to move faster (Witt & Sugovic, 2013). Consequently, perceiving a stimulus as moving faster or being closer may prompt a response that would minimize the opportunity for the stimulus to cause harm.

When an individual encounters a stimulus, his or her reaction to it determines how he or she understands a situation. Both valence and arousal can affect one's perception of a situation. For example, negative valence can lead to the perception of a stimulus as producing costs to the perceiver, while positive valence can lead the perceiver to have a more beneficent perception of a stimulus. In addition, high arousal combined with negative valence can cause an individual to focus on risks in a situation. In particular, one negative emotion, fear, has a profound effect on perception; if an individual is feeling fearful, then he or she may tend to perceive a stimulus as more threatening relative to individuals who are not feeling fearful. Consequently, previous research collectively suggests that threatening stimuli often elicit high arousal, negative valence emotions, such as fear. These emotions, in turn, can lead an individual to perceive a stimulus in a way that increases the sense of threat. As a result, the individual may react negatively towards the stimulus in order to protect himself or herself from potential harm; this reaction will be maladaptive if the stimulus is innocuous.

Section 3: The Effect of Threat Perception on Decision-Making and Inhibitory Control

The impact of emotion on threat perception can influence the action chosen by an individual. A decision can be made using both emotion and evaluation of risk. According to the *risk-as-feelings hypothesis*, both emotional reactions and expected utility (EU) theory—the theory that an option's utility is determined by the expected outcome value and the likelihood of that outcome occurring (Kahneman & Tversky, 1979)— are used when making a risky decision (Loewenstein, Weber, Hsee, & Welch, 2001). However, there can be a stronger influence from an emotional reaction. For instance, when an emotion and cognitive evaluation contradict each other, more weight is given to emotion in making a decision. An emotional reaction to a potential risk can also occur without the presence of cognitive evaluation, further demonstrating the potency of emotion in risky decision-making (Loewenstein et al., 2001). The risk-as-feelings hypothesis demonstrates that decision-making is not just a cognitive process; emotion is a strong determining factor. When faced with making a decision during a threatening situation, in addition to emotional influence, the choice with a preferred outcome and high degree of certainty may be chosen in order to minimize risk of injury.

Another means that a decision can be made is through the ability and tendency to perceive a threat. According to *signal detection theory* (SDT; Green & Swets, 1966) behavior can be described in terms of sensitivity (the ability to perceive differences between targets and non-targets) and bias (the tendency to perceive stimuli as targets). There are four possible decisions: correct detections, correct rejections, missed detections, and false alarms. The former two decisions provide benefit to the perceiver while the latter two are detrimental (Lynn & Barrett, 2014). Thus, what is important to decision-making in threatening circumstances is how easy it is to perceive aspects of a stimulus that indicate it is a true threat and whether there is a tendency to perceive threat or lack of threat in a situation.

While decision-making is the process of choosing between options, judgement involves determining the likelihood of an event occurring (Blanchette & Richards, 2010). In addition to influencing decision-making, emotion also influences one's judgment. Being exposed to a stimulus inducing negative affect, such as anxiety, leads to estimating negative events as occurring more frequently (Constans, 2001; Johnson and Tversky, 1983). Likewise, being sensitive to cues regarding punishment instead of reward in one's environment is associated with a higher prediction of the occurrence of negative events (Zelenski & Larsen, 2002). Judging the likelihood of negative events influences decision-making. For instance, people are less willing to take a risk when loss has a low probability, and more willing when there is a low probability for gain (Tversky &

Kahneman, 1992). Similar to judgment, threat has an influence on risk-based decision-making. Experiencing high threat can lead to risk aversion, with individuals being less likely to prefer a choice with a high probability of a small gain and small probability of a large loss regardless of state anxiety level. (Matthews, Panganiban, & Hudlicka, 2011). Thus, when a decision must be made about whether or not to engage in an action while under significant threat, the option that avoids a large loss may be chosen.

Critically, action-based decisions, including those involving risk, are guided by both decision-making and the inhibition of inappropriate responses. Thus, it is important to understand how threat influences both decision-making and inhibitory control. Previous research demonstrates that threat exposure can reduce response inhibition performance (Hartikainen, Siiskonen, & Ogawa, 2012; Pessoa, Padmala, Kenzer, & Bauer, 2012). This exposure would naturally lead to the experience of the negative, high arousal state of feeling threatened. However, arousal has more of an influence on response inhibition than valence of the threat itself (Pessoa et al., 2012). Thus, an individual experiencing high physiological arousal under a threatening situation is more likely to respond defensively. On the other hand, if the individual regulates his or her physiological response so as to experience less arousal, the individual may have more control over his or her conditioned response to the threat.

<u>Section 4:</u> Theoretical Background

As has been demonstrated, there can be different responses to a threat stimulus. A threatening stimulus is but one of the many types of stimuli that an individual can react to. There are three behavioral reactions that can be directed towards a stimulus: approach, fight-flight-freeze, and behavioral inhibition. The reaction will vary based on individual assessment of a stimulus, environment, and situation (Corr, 2013). To understand this reaction, it is crucial to distinguish between approach and avoidance. Approach involves directing one's energy towards a positive stimulus, while avoidance involves directing one's energy away from a negative stimulus (Elliot, 2006).

The way in which individuals evaluate stimuli as either positive or negative guides (1) the decision to approach or avoid the stimulus and (2) the speed at which this decision is made (Elliot & Covington, 2001). For example, when a threatening (i.e., negative, high arousal) stimulus is perceived as imminent, the fight-flight-freeze system is activated, and evaluations are made quickly. However, if the threat is perceived as far away, behavioral inhibition can be used, and cognitive processing is controlled. Behavioral inhibition in this situation allows the individual to approach a stimulus carefully (Corr, 2013). In contrast, being under imminent threat can cause an individual to approach an object faster (Arnaudova, Krypotos, Effting, Kindt, & Beckers, 2017). These behavioral tendencies demonstrate that the characteristics of a threat determines how a stimulus is processed and in turn the behavior of an individual towards that stimulus.

With the presence of potential threats in the environment it is important for an individual to know how and when to protect himself or herself. According to *protection motivation theory*, an individual is motivated to protect himself or herself after perceiving a threat that could result in an unfavorable outcome (Floyd, Prentice-Dunn, & Rogers, 2000). SDT relates to this theory in that the level of sensitivity and bias influence whether a stimulus is assessed as a threat. Determining that a stimulus is a threat constitutes either a correct detection or false alarm depending on whether the stimulus is truly noxious. Furthermore, the determination of noxiousness can be influenced by familiarity. Being familiar with a scenario can lead to the assessment of the severity and likelihood of the occurrence of a noxious event (Rogers, 1975). A stimulus' level of noxiousness, probability of occurring, and an individual's coping response efficacy are appraised in an encounter. If the stimulus is very noxious, likely to occur, and there is an opportunity to cope, protection motivation will be activated (Rogers, 1975). However, according to SDT, false alarms are a possibility. Thus, it is possible that protection motivation will be activated in the presence of an innocuous stimulus. In contrast, there are also times when protection motivation is not activated in a potentially threatening situation. The decision to protect oneself is less likely when reward for not protecting is high and there are costs to protecting oneself (Floyd et al., 2000). Thus, an individual must decide if the benefits outweigh the costs in acting defensively.

One way that individuals can weigh these costs and benefits is through cognitive appraisal, or the process of interpreting an emotional situation and one's reaction to it. This appraisal is guided by one's perception of a stimulus as either threatening or innocuous as well as one's ability to cope with the situation (Smith & Lazarus, 1990). This evaluation guides how an individual responds to a situation. For instance, if coping is effective, then a change in appraisal will occur that will result in a more positive emotion. However, if coping is ineffective, then a more negative emotion will occur (Smith & Lazarus, 1990). Thus, in situations in which a stimulus is appraised as a threat and an individual believes that he or she can cope effectively, the individual is likely to respond adaptively toward the stimulus to effectively minimize the threat. In contrast, when an individual does not believe that he or she can cope effectively with such a threat, then a maladaptive, reactive behavior is likely to occur.

Although emotion can influence actions, one's actions can often be suppressed as a means of coping (Smith & Lazarus, 1990). Another means of coping, emotion-focused, can involve a change in emotion with or without changing the meaning of an event (Smith & Lazarus, 1990). Thus, when faced with a potential threat, an individual can alter his or her feelings towards the stimulus, possibly by re-evaluating the original assessment of the stimulus as threatening. This re-evaluation may enhance the likelihood that an individual will respond adaptively to mitigate a threat.

Section 5: Reappraisal

The adaptiveness of re-evaluation demonstrates that appraisal involves balancing the desire to view situations realistically and to view them positively. The desire to view situations positively may involve the reinterpretation of the meaning of a stimulus, which is known as reappraisal (Lazarus, 2001). During reappraisal, altered physiological and cognitive responses are used to cope with a stressful event (Jamieson, Mendes, & Nock, 2013). However, there are limits to somatic regulation as there is evidence that reappraisal of a disturbing stimulus leads to the same physiological response as experiencing the stimulus without attempts to engage in coping strategies (Gross, 1998). Thus, when faced with a threat, an individual can work to consciously reinterpret the situation in order to feel less distressed. However, it is possible that if the situation is extremely threatening, the individual will still experience a negative physiological reaction, making reappraisal unsuccessful.

When it comes to stress-inducing stimuli, an important distinction should be made between challenge and threat. Threat is a reaction to damage that might possibly occur, while challenge is a positive experience involving facing obstacles (Lazarus, 2001). Logically, it follows that threat appraisal focuses on potential loss, while challenge appraisal focuses on potential gain (Anshel, Robertson, & Caputi, 1997). Both threat and challenge involve uncertainty because they involve a focus on the future (Lazarus, 2001). However, appraising a situation as threatening is related to perceived lack of control, while appraising a situation as a challenge is associated with perceiving the situation as controllable (Anshel et al., 1997). Furthermore, according to the *biopsychosocial model* of challenge and threat, challenge occurs when situational demands do not exceed perceived resources, while threat occurs when these demands exceed perceived resources (Jamieson et al., 2013). Based on this model, whether an intimidating situation is judged as a true threat is determined by an individual's ability to cope. Coping ability in turn will determine the action taken to respond to the encountered situation as either a threat or non-threat.

Reappraising a situation can lead to viewing it positively, whether it is perceived as a threat or a challenge (Anshel et al., 1997). Consequently, reappraisal can lead to reductions in negative affect. This reduction in negative affect, including fear, can lead to an increase in risk taking (Heilman, Crişan, Houser, Miclea, & Miu, 2010). This increase is due to reappraisal's association with perceiving a situation as controllable and increased confidence (Anshel et al., 1997; Jamieson, Mendes, Blackstock, & Schmader, 2010). Thus, if someone is faced with making an urgent decision while under threat, reappraising the situation can lead to the selection of a choice of action that is riskier than the one the individual would select acting solely on fear.

Section 6: Influences on Shooting Behavior

The risk taking associated with reappraisal is relevant for certain occupations that involve decision-making under threat. For example, law enforcement and military personnel must often make a decision regarding whether or not to discharge a firearm. Being in a stressful, high-threat situation can make a shooter discriminate less accurately between a friendly and enemy target (Gamble et al., 2018). Moreover, the decision of whether to shoot a person in a threatening situation involves a rewarding versus unpleasant result. For instance, not shooting an armed individual would lead to the unpleasant result of injury to or death of the police officer or soldier, while shooting an armed individual would lead to the rewarding result of preserving one's own life and potentially even protecting others. In the case of an unarmed person, shooting would lead to an unpleasant result, while not shooting would lead to the rewarding result of preserving an innocent civilian's life. Recent research demonstrates that when the most rewarding choice is associated with imminent threat, individuals tend to avoid that choice and instead choose an option that is less rewarding (Bublatzky, Alpers, & Pittig, 2017). When this threat is no longer imminent, however, the option with a higher probability of reward is favored (Bublatzky et al., 2017). Thus, if a police officer or soldier approaches a situation with the intention not to shoot an individual if they are unarmed (most rewarding choice), but the ambiguity of the situation or characteristics of the individual causes an imminent sense of threat, he or she may choose to discharge a firearm. However, if after a period of time the police officer or soldier continues to interact with the potentially dangerous individual and no harm occurs, then he or she may likely not shoot.

The decision to shoot a target is greatly influenced by perception of threat level. The reaction to threat can be framed as approach (shooting) and avoidance (not shooting). When threatened, individuals are faster to approach a stimulus. In contrast, they are faster to avoid a stimulus if there is no threat present (Arnaudova et al., 2017). Thus, shooting an armed target occurs faster while under high threat compared to low threat (Nieuwenhuys, Savelsbergh, & Oudejans, 2015). Additionally, a study that evaluated how police officers perceive different sources of information as important or unimportant factors in deciding whether or not to use deadly force showed that police officers take very limited information into account when making this decision. The information that was considered most important included the presence of a suspect's weapon, physical distance from the suspect (closer distance increased the likelihood of using deadly force), the presence of bystanders, and availability of backup (Hayden, 1981). Thus, the evaluation of threat level according to characteristics of an encounter (e.g. the presence of a gun) is crucial in determining whether to use lethal force and the speed at which this decision is made.

In addition to characteristics of the situation, characteristics of the individual being targeted can affect the behavior of the shooter. For instance, Blacks tend to be mentally processed as more threatening than Whites, especially if the individual making the assessment holds or is aware of negative stereotypes about Blacks (Correll, Urland, & Ito, 2006). Thus, there is a *shooter bias* of being more likely and faster to shoot armed targets when they are Black, and less likely and slower to shoot unarmed targets when they are White (Correll, Park, Judd, & Wittenbrink, 2002; Akinola & Mendes, 2012). Based on these findings, Blacks are seen as more threatening than Whites and are thus more likely to be shot in a confrontation involving a firearm. Thus, it is important to include both Black and White targets in the research design.

In addition to the qualities of the individual being targeted, certain qualities of the shooter may also matter in high-threat or deadly force situations. Research is very limited on the effects of individual factors on police shootings (Donner, Maskaly, Piquero, & Jennings, 2017). However, in terms of the Big Five personality traits, neuroticism shows a positive relationship with fear and perceived threat intensity (Craske et al., 2009; Hengartner, van der Linden, Bohleber, & von Wyl, 2017; Perkins, Cooper, Abdelall, Smillie, & Corr, 2010). Furthermore, neuroticism is also associated with negative coping (Hengartner et al., 2017). Consequently, being high in neuroticism may be associated with an increased likelihood of perceiving a target as threatening and taking inappropriate action, such as shooting an unarmed target. As mentioned previously, emotions can be regulated as a means of coping and this regulation also occurs during reappraisal. Thus, an investigation into how individual differences in coping strategies impact decision-making during high-threat situations is important to examine.

Individual differences in biological sex and working memory capacity may also impact action-based decision-making under threat. For example, previous work shows that increasing the number of female police officers has been shown to reduce shootings, as being male is positively correlated with involvement in shootings (Donner et al., 2017). Furthermore, those with higher working memory capacity (WMC) have better judgment on whether to shoot; individuals with lower WMC are more likely to shoot an unarmed target and less likely to shoot an armed target (Brewer, Hunter Ball, & Ware, 2016; Kleider & Parrott, 2009; Kleider, Parrott, & King, 2010). Seemingly, having more cognitive resources acts as a mitigating factor of erroneous shooting behavior when under threat. Consequently, biological sex and WMC will be included as covariates in this present research.

Section 7: Study Overview

One possible way to reduce shooting errors may be reappraisal; reassessing a target as threatening or nonthreatening in a confrontation may change whether or not an individual decides to shoot. However, the research on rapid reappraisal in shooting situations is limited. Additionally, individual difference factors may influence both how a threat is perceived initially and how it is perceived after reappraisal. For instance, research would suggest that being high in neuroticism would be associated with being more likely to shoot an unarmed target, due to experiencing a higher threat intensity than would be experienced by someone lower in neuroticism. To examine the impacts of reappraisal along with individual factors on action-based decision-making, a “shoot-don’t shoot" task was performed. Individuals were required within a short period of time to decide whether or not a target was a threat or innocuous under a state of ambiguity.

This present research investigates how various factors affect the decision of what action to take. The exploratory investigation of personality variables provides insight into how individual differences affect decisions under high-stakes situations. The behavior of the target is also important in decision-making. Whether the target moves closer, farther away, or stays the same distance after initial appraisal may determine an individual's reaction to it, as change in distance is related to an individual's threat perception. To examine these factors, participants were presented with targets to which they had to respond rapidly with the decision to shoot or not shoot. In addition to the initial evaluation, participants also had to decide what action to take after the same target reappeared either changed or unchanged (through distance).

Replicating previous research (Correll et al., 2002), it is predicted that accuracy will be lowest for Black targets holding non-weapon items *(Hypothesis 1a)*, and participants will be less accurate when the target is holding a gun relative to when the target is holding a non-weapon *(Hypothesis 1b)* in the standard phase. Participants will respond faster when a target is armed *(Hypothesis 2a)*, and participants will shoot an armed target faster if he is Black *(Hypothesis 2b)* in the standard phase. Additionally, after an opportunity for situational reappraisal, individuals will be less likely to shoot an unarmed target compared to situations where there is no opportunity for reappraisal, due to the individuals evaluating the situation as less threatening. Taking the time to reappraise the situation will lead individuals to perceive that there is no immediate threat

(*Hypothesis 3)*. When the target is farther away, the individual will be less accurate in shooting an unarmed target due to the activation of the fight-flight-freeze response. In comparison when the target moves farther away, the individual will be less likely to shoot an unarmed target due to him or her being more inhibited and taking more time to evaluate the situation (*Hypothesis 4)*. Having the opportunity to reappraise the situation will result in a change in decision if the target moves closer or farther away (*Hypothesis 5a)*. Participants will be more likely to have the same response during reappraisal when a target holding a weapon moves closer *(Hypothesis 5b)*. In addition to characteristics of the target influencing decision, the influence of shooter characteristics (i.e. individual differences) will also be examined. The relationships between the decision to shoot or not shoot and the individual characteristics explored in our hypotheses are exploratory, as the literature does not cover these relations. One such individual difference is coping strategy. The two coping strategies that will be focused on in this study are suppression— which consists of an emotional response being inhibited— and reappraisal, which involves framing a situation in a way that causes a change in emotional experience (Gross & John, 2003). Our prediction is that individuals with higher coping skills (using reappraisal more than suppression as a strategy) will make less errors and be more likely to choose the non-lethal course of action when a target is unarmed, while those with lower coping skills (using reappraisal less than suppression as a strategy) will be more likely to shoot unarmed targets (*Hypothesis 6a*). Another individual difference examined for effects on shooting performance is the personality trait neuroticism. Based on the relationship threat perception and coping capacity have with neuroticism, it is predicted individuals high in neuroticism will have lower accuracy and be more likely to shoot unarmed targets regardless of race *(Hypothesis 6b)*. Furthermore, being high in coping skills will be associated with a tendency to keep responses the same *(Hypothesis 7a)*, while being high in neuroticism will be associated with making different responses during the reappraisal period *(Hypothesis 7b)*.

METHOD

Participants

An a priori power analysis was performed using G*Power 3.1. Results indicated that to have 80% power to detect a medium effect size (f^2 = .15) with an alpha level of .05, a minimum of 114 total participants would be needed. Participants were Clemson University undergraduate students at least 18 years of age who participated in the study for class credit through an online registration system, SONA. There were 141 participants (111 females, 30 males; mean age = 18.76 ± 1.26). Two participants' survey data were excluded due to technological errors; thus, the final sample for the primary analyses was 139. Of the final sample, eight participants identified as Asian/Pacific Islander, eight as Black, 113 as White, four as Hispanic/Latino, and six as more than one race.

Materials

Demographics. Information was collected regarding participant age, biological sex, ethnicity, and family socioeconomic status. In addition to these sociological factors, information on handedness and familiarity with guns was also collected.

Action-Based Decision-Making Task. To operationalize a high-threat situation, an action-based decision-making task that is a modified version of a well-established experimental task known as the First-Person Shooting Task (FPST; Correll, et al., 2002) was used. The FPST consists of trials displaying an image of a young man in different poses against various outdoor public scene backgrounds, such as parks, city sidewalks, or transportation terminals. In the present study, there were two different trial types: the standard FPST trial types and reappraisal trial types. All participants completed both trial types (one block of standard trials followed by a second block of reappraisal trials), thus the study consisted of a within-subjects design. On all trials, half of the men were White and half were Black and were shown holding either a gun or a harmless object. As there were four different possible pairings between race of the target and object type (White target/gun, White target/harmless object, Black target/gun, Black target/harmless object), each combination made up one quarter of the response trials. The harmless objects were either a soda can, a cell phone, or a wallet. The presentation of these items during the harmless object trials was random.

During all trials of the task, participants viewed several backgrounds that were displayed for 500 ms – 1000 ms (time duration was randomized for each trial). On some of the backgrounds, a target (White or Black man) appeared. On the standard one-step FPST trials, when the target appeared, participants had to decide within 630 ms whether or not the object was a gun and how to react. This design served to prevent participants from knowing where or when a target would appear or when exactly to make a response. Participants were told that the men with guns were the "bad guys" and the men without guns were the "good guys", and that they should shoot the bad guys and help the good guys. If the object the target was holding was a gun one key was pressed to “shoot”; if the object was harmless another key was pressed to “help”.

On standard one-step FPST trials, participants simply decided whether to shoot or help and then received feedback on whether the decision was correct. A sample trial with an image taken from Correll, Hudson, Guillermo, & Ma (2014) is shown in Figure 1. A practice demonstration of these trial types can be found at http://psych.colorado.edu/~jclab/FPST/demo/canvas/ testPrograms/st_v.1.html. On reappraisal trials, participants were told that the task has changed because they had entered new territory and that it now consisted of two steps. In the first step, they should respond as they did in the first phase of trials by deciding whether to shoot or help the target based on whether or not the target is holding a gun. No feedback would be given on performance accuracy during this first step. As part of the second step, the same target would appear again either coming closer, moving farther away, or remaining the same distance as it was the first time it appeared. If the target moved closer the participant should shoot; if the target moved farther away the participant should help him. If the target stayed in the same position, participants should respond as they did in the first step by shooting if the target had a gun or helping if the target did not have a gun. Thus, participants had to reappraise the threat level of the target to respond correctly. Correct responses on the second step followed the same feedback procedure as the standard FPST one-step trials (points for correct responses; penalties for incorrect responses). A sample trial is shown in Figure 2 with an image taken from Correll et al. (2014).

Task feedback took the form of a point system with points being gained for a correct decision and deducted for an incorrect decision. Hits (shooting an armed target) were worth 10 points and correct rejections (helping an unarmed target) were worth 5 points. False alarms (shooting an unarmed target) led to a loss of 20 points, while misses (helping an armed target) led to a loss of 40 points. Not responding within the allotted time led to a deduction of 25 points. Good performance was monetarily incentivized; after completing the task, participants received $1 for every 100 points with a maximum of $10 being offered.

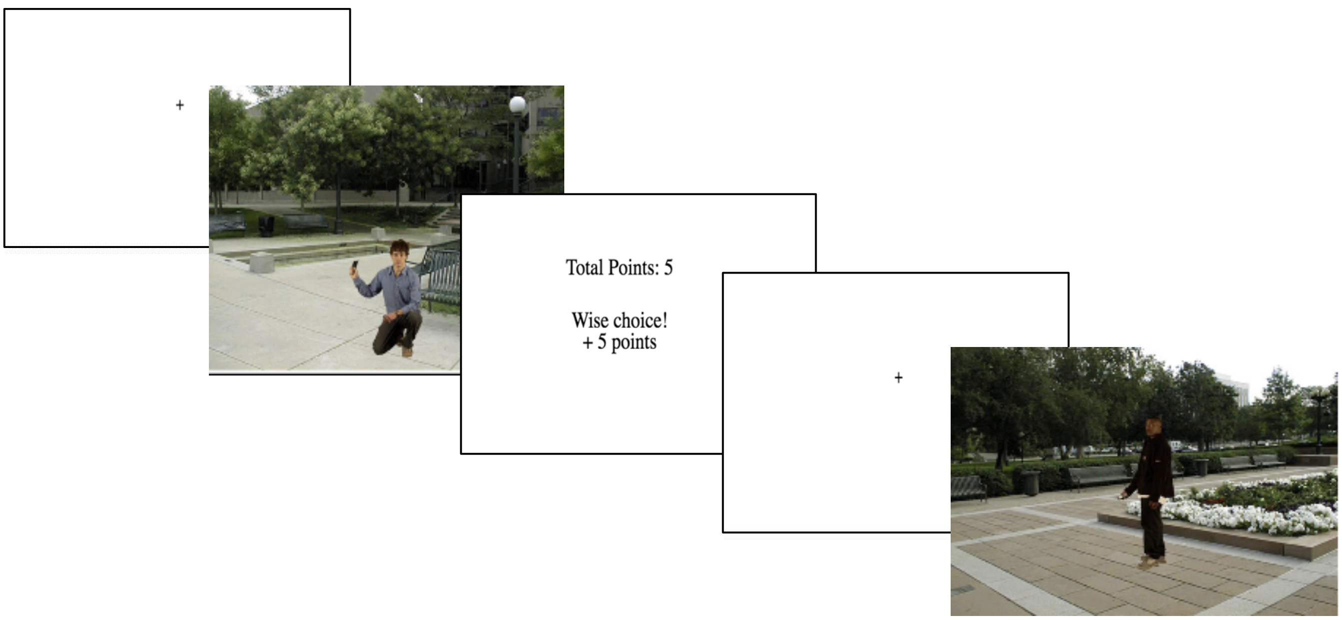

Figure 1. Sample of a FPST trial for the one-step standard condition of the action-based decision-making task.

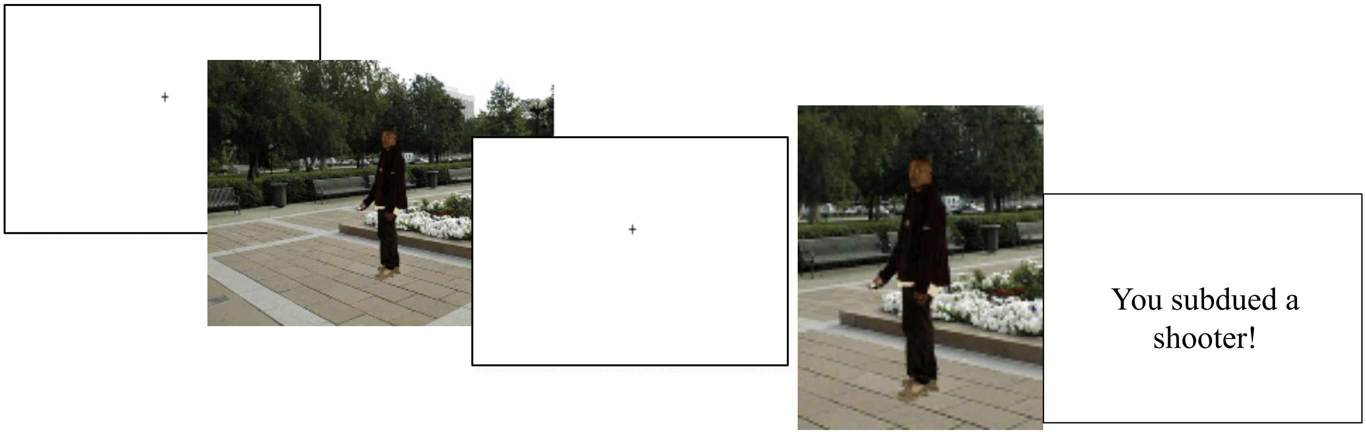

Figure 2. Sample of a trial for the two-step reappraisal condition of the action-based decision-making task.

Familiarity with Guns. The familiarity with guns questionnaire used a five-point Likert scale from *strongly disagree* to *strongly agree.* The questions were as follows: 1) I am a gun owner. 2) I would be able to use a gun safely and accurately. 3) I play first-person shooter video games.

Coping Strategies. The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) was used to assess coping strategy. It consists of Reappraisal and Suppression subscales with items on a 1 (Strongly Disagree) to 7 (Strongly Agree) scale. Having a score higher in Reappraisal is equivalent to having higher coping skills.

Big Five Personality. The Big Five Inventory (BFI; John, Donahue, & Kentle, 1991) which measures five dimesions of personality, was used to assess level of neuroticism with items on a 1 (Disagree Strongly) to 5 (Agree Strongly) scale. Higher scores reflect greater degrees of neuroticism.

Working Memory Capacity (WMC). The Operation Span Test (OSPAN; Turner & Engle, 1989) is a task that was used to assess WMC. In the OSPAN, a math problem was displayed for two seconds after which a number appeared. The participant had to decide whether or not the number answered the math problem by responding “true” or “false”. After a response was given a letter appeared. After each set of trials ranging from three to seven math problem-letter sets, participants had to recall the letters in order. There were 75 trials in total. The average number of letters correctly recalled in order for each set were calculated to get the average letter span.

Procedure

After giving informed consent, participants were led to a computer. First, they completed a demographics survey, as well as questions about handedness and familiarity with guns. Afterwards, they completed the BFI and ERQ. The participants then completed the OSPAN. Subsequently, participants completed the standard phase of the action-based decision-making task followed by the reappraisal phase. In the standard phase, they were instructed that their task is to shoot any person holding a gun by pressing the “L” key and to press the “A” key if a person is holding something besides a gun. In the reappraisal phase, they were told that on some trials, the person may change position and they may have to respond again based on the person’s new position—pressing the “L” key if the target approaches or the “A” key if the target moves farther away. All participants were informed in the instructions that they had less than one second to make a decision on each trial and that they would receive points based on their performance, which would be converted to a cash bonus at the end of the study. Participants completed 10 practice trials (five standard one-step FPST trials and five two-step reappraisal trials). After the practice trials, participants began the task. There were 80 one-step trials and 80 two-step trials. All participants were paid according to their performance and debriefed at the end of the study.

RESULTS

Descriptives

Descriptive statistics were performed on the predictor variables: Neuroticism, Reappraisal, and Suppression. On the BFI participants' Neuroticism scores ranged from 10 to 38 (M = 24.30, SD = 6.62). On the ERQ Reappraisal scores ranged from 18 to 42 (M = 32.09, SD = 5.38) and Suppression scores ranged from 4 to 27 (M = 14.57, SD = 6.02). Outlier values that were more than 2.5 standard deviations above or below the mean of the outcome variables were removed. Three outliers were removed from the outcome variable Accuracy Rate of the standard trials, and two from Accuracy Rate of the reappraisal trials.

Pearson's correlations were conducted between the outcome variables, predictors, and covariates. The correlations are shown in Table 1 below. The ability to use a gun safely ($r(134) = .182$, $p = .03$) and OSPAN score ($r(134) = -.182$, $p = .03$) significantly correlated with accuracy during the reappraisal trials. These covariates, however, did not significantly predict the other outcome variables. Being a gun owner, having experience with first-person shooters, Neuroticism, Reappraisal, and Suppression did not correlate significantly with any of the outcome variables. Independent samples t-tests were conducted to determine the relationship between biological sex and the outcome variables. All t-tests were nonsignificant, indicating a lack of relationship between biological sex and the outcome variables: accuracy rate of the standard trials ($t(136)$ = -

.859, *p* = .392), accuracy rate of the reappraisal trials (*t*(137) = .280, *p* = .780), and the difference in accuracy rate between the standard and reappraisal trials (*t*(139) = -.309, *p* = .757). One-way ANOVAs were conducted to determine the relationship between handedness (left-handed, right-handed, and ambidextrous) and the outcome variables. The between-subjects results were nonsignificant, indicating a lack of relationship between handedness and the outcome variables: accuracy rate of the standard trials (*F*(2, 133) = .734, *p* = .482), accuracy rate of the reappraisal trials (*F*(2, 134) = .635, *p* = .531), and the difference in accuracy rate between the standard and reappraisal trials(*F*(2, 136) = .080, *p* = .923).

Table 1

Correlations of Covariates and Predictors with Accuracy Rate During Standard and Reappraisal Trials

	1	2	3	4	5	6	7	8	9
1. GunSafe									
2. GunOwner	.585**								
3. FPS Exp	.304**	.146							
4. OSPAN	-.028	-.091	-.060						
5. Big5N	-.164	-.145	-.045	-.136					
6. Reappraisal	.031	.089	-.112	.128	-.238**				
7. Suppression	.054	.135	.153	-.141	.101	-.016			
8. AccStand	.080	-.007	.072	.089	.011	.001	-.024		
9. AccReapp	-.033	.012	-.049	.084	-.003	.046	-.026	.419**	

Note. GunSafe = ability to use a gun safely and accurately in an emergency situation; GunOwner = being a gun owner; FPS Exp = first-person shooter video game experience; OSPAN = Operation Span Test; Big5N = Neuroticism; AccStand = accuracy rate during standard trial; AccReapp = accuracy rate during reappraisal trials.
*$p < .05$
**$p < .01$

Hierarchical Regressions

Overview. Seven two-step hierarchal regressions were conducted on the data to predict the outcome variables. For each regression, the covariates entered into the first step of the regression were Handedness, Biological Sex, and OSPAN scores. The predictors entered into the second step were Neuroticism, Suppression, and Reappraisal. The outcome variables were accuracy rate for the standard trials, accuracy rate for the reappraisal trials, and the difference in accuracy rate between the standard and reappraisal trials, average reaction time for the standard trials, average reaction time for step one of the reappraisal trials, average reaction time for step two of the reappraisal trials, and the difference in average reaction time between the two steps in the reappraisal trials. Hypotheses 6a (involving Reappraisal and Suppression) and 6b (involving Neuroticism) are addressed in the analyses involving accuracy rate.

Accuracy rate for standard trials. The omnibus prediction at the first step was nonsignificant, $R^2 = .016$, $F(3, 132) = .695$, $p = .557$. OSPAN ($\beta = .104$, $p = .230$), Handedness ($\beta = .004$, $p = .964$), and Biological Sex ($\beta = .069$, $p = .429$) were all nonsignificant in predicting accuracy at this step. The omnibus prediction at the second step was nonsignificant, $\Delta R^2 = .003$, $F(6, 129) = .398$, $p = .879$. Neuroticism ($\beta = .048$, $p = .609$), Reappraisal ($\beta = -.002$, $p = .978$), and Suppression ($\beta = -.028$, $p = .755$) were all nonsignificant in predicting accuracy at this step. Thus, neither Hypothesis 6a nor 6b are supported.

Accuracy rate for reappraisal trials. The omnibus prediction at the first step was nonsignificant, $R^2 = .009$, $F(3, 133) = .381$, $p = .767$. OSPAN ($\beta = .085$, $p = .324$), Handedness ($\beta = -.019$, $p = .825$), Biological Sex ($\beta = -.032$, $p = .715$) were all nonsignificant in predicting accuracy at this step. The omnibus prediction at the second step was nonsignificant, $\Delta R^2 = .002$, $F(6, 130) = .222$, $p = .969$. Neuroticism ($\beta = .010$, $p = .920$), Reappraisal ($\beta = .041$, $p = .654$), and Suppression ($\beta = -.011$, $p = .904$) were all nonsignificant in predicting accuracy at this step. Thus, neither Hypothesis 6a nor 6b are supported.

Difference in accuracy rate between the standard and reappraisal trials. The omnibus prediction at the first step was nonsignificant, $R^2 = .001$, $F(3, 135) = .047$, $p = .987$. OSPAN ($\beta = -.019$, $p = .825$), Handedness ($\beta = .005$, $p = .956$), and Biological Sex ($\beta = .026$, $p = .765$) were all nonsignificant in predicting accuracy at this step. The omnibus prediction at the second step was nonsignificant, $\Delta R^2 = .010$, $F(6, 132) = .254$, $p = .957$. Neuroticism ($\beta = .055$, $p = .558$), Reappraisal ($\beta = -.034$, $p = .707$), and Suppression ($\beta = .071$, $p = .430$) were all nonsignificant in predicting accuracy at this step.

Average reaction time for standard trials. The omnibus prediction at the first step was nonsignificant, $R^2 = .020$, $F(3, 135) = .935$, $p = .426$. OSPAN ($\beta = -.046$, $p = .592$), Handedness ($\beta = -.001$, $p = .991$), and Biological Sex ($\beta = -.135$, $p = .115$) were all nonsignificant in predicting average reaction time at this step. The omnibus prediction at the second step was nonsignificant, $\Delta R^2 = .006$, $F(6, 132) = .590$, $p = .738$. Neuroticism ($\beta = .065$, $p = .485$), Reappraisal ($\beta = .061$, $p = .498$), and Suppression ($\beta = -.015$, $p = .867$) were all nonsignificant in predicting average reaction time at this step.

Average reaction time for reappraisal trials (step one). The omnibus prediction at the first step was nonsignificant, $R^2 = .026$, $F(3, 135) = 1.181$, $p = .319$. OSPAN ($\beta = -.103$, $p = .228$), Handedness ($\beta = .088$, $p = .305$), and Biological Sex ($\beta = -.083$, $p = .328$) were all nonsignificant in predicting average reaction time at this step. The omnibus prediction at the second step was nonsignificant, $\Delta R^2 = .011$, $F(6, 132) =$

.825, p = .552. Neuroticism (β = .108, p = .244), Reappraisal (β = .047, p = .600), and Suppression (β =-.019, p = .829) were all nonsignificant in predicting average reaction time at this step.

Average reaction time for reappraisal trials (step two). The omnibus prediction at the first step was nonsignificant, R^2 = .025, F(3, 135) = 1.141, p = .335. OSPAN (β = -.079, p = .357), Handedness (β = .021, p = .804), and Biological Sex (β = -.134, p = .118) were all nonsignificant in predicting average reaction time at this step. The omnibus prediction at the second step was nonsignificant, ΔR^2 = .041, F(6, 132) = 1.551, p = .166. Neuroticism (β = .186, p = .044) was significant in predicting average reaction time at this step, while Reappraisal (β = .080, p = .360) and Suppression (β = -.126, p = .148) were not.

Difference in average reaction time between step one and two in the reappraisal trials. The omnibus prediction at the first step was nonsignificant, R^2 = .018, F(3, 135) = .821, p = .484. OSPAN (β = .029, p = .735), Handedness (β = -.100, p = .256), and Biological Sex (β = -.091, p = .287) were all nonsignificant in predicting the difference in average reaction time between steps one and two in the reappraisal trials at this step of the regression. The omnibus prediction at the second step was nonsignificant, ΔR^2 = .042, F(6, 132) = 1.397, p = .220. Neuroticism (β = .138, p = .133) and Reappraisal (β = .060, p = .495) were nonsignificant in predicting the difference in average reaction time between steps one and two in the reappraisal trials at this step of the regression, while Suppression (β = -.177, p = .043) significantly predicted this step in the regression.

Mixed Effects Logistic Regressions

Two generalized linear mixed effects logistic regression analyses were conducted to examine the effect of biological sex, item, target race, WMC, coping strategies, and neuroticism on accuracy during each trial for the standard and reappraisal FPST. Accuracy was coded 1 for a correct decision ("Shot the Shooter" or "Helped a civilian”) while an incorrect decision was coded as 0. The fixed effect predictors were specified as Item (Gun vs. Non-weapon) with the items that weren’t guns as the baseline (Non-weapon = 0), Target Race (Black vs. White) with White coded as the baseline (White = 0), Biological Sex (Male vs. Female) with Female as the baseline (Female = 0), Suppression, Reappraisal, Neuroticism, and WMC. The random effect predictor was Participant, which accounted for repeated measures per participant. One model was used to predict Accuracy for the standard FPST, and another model was used to predict Accuracy for the reappraisal FPST. In the reappraisal trials participants were considered outliers if they did not respond at least 25% (40 trials) of the time. Based on this criterion a total of 14 outliers were removed. The average accuracy rate for the standard trials was .90 (*SD* = .08), and .55 (*SD* = .07) for Step 2 of the reappraisal trials. All data was analyzed with R version 3.6.1.

Table 2

Generalized Linear Mixed Effects Logistic Regression Predicting Accuracy for Standard Trials

Variable	B	SE	z	p
(Intercept)	1.284	0.889	1.445	.148
Item	1.345	0.760	1.771	.077
Race	-0.473	0.677	-0.699	.485
Reappraisal	0.012	0.019	0.611	.541
Suppression	-0.007	0.017	-0.415	.678
Neuroticism	0.007	0.016	0.443	.658
Sex	0.117	0.196	0.595	.552
OSPAN	0.009	0.006	1.404	.160
Item x Race	-0.455	1.026	-0.443	.658
Item x Reappraisal	-0.037*	0.018	-2.020	.043
Race x Reappraisal	0.026	0.017	1.548	.122
Item x Suppression	0.027	0.016	1.687	.092
Race x Suppression	-0.006	0.014	-0.438	.662
Item x Neuroticism	-0.012	0.014	-0.826	.409
Race x Neuroticism	0.002	0.013	0.121	.904
Item x Race x Reappraisal	-0.004	0.025	-0.156	.876
Item x Race x Suppression	0.007	0.022	-0.335	.738
Item x Race x Neuroticism	0.022	0.020	1.139	.255

Note. Race = Target Race; OSPAN is a measure of WMC.
*$p < .05$

Model predicting accuracy for standard trials. To address Hypotheses 1a and 1b, a model predicting Accuracy in the standard trials was created. As coping (Reappraisal and Suppression) and Neuroticism are predictor variables in the model, Hypotheses 6a and 6b are also addressed. The syntax for this model was: Accuracy ~ Item*Race* Emotional Reappraisal + Item*Race* Emotional Suppression + Item*Race* Neuroticism + Biological Sex + OSPAN + (1 | Participant). The results of the regression are shown in Table 2. The results of the mixed effects logistic regression model revealed that an Item X Reappraisal interaction significantly predicted Accuracy (B = -0.037, p = .043). This result demonstrates that when the item was a gun, the higher the Reappraisal score, the more likely the participant was to respond accurately. All other main effects and interactions were nonsignificant. According to the significance of the Item X Reappraisal interaction, Hypothesis 6a is supported when the item was a gun. However, as all main effects and interactions including Neuroticism were not significant, Hypothesis 6b is not supported. Furthermore, because of the non-significant Item X Race interaction, these results do not support Hypothesis 1a in which it was predicted that accuracy would be lower for Black targets holding non-weapons. Similarly, since the main effect of Item was not significant, Hypothesis 1b is not supported.

Accuracy comparison between Step 1 and Step 2. To address Hypothesis 3, we assessed the change in accuracy from Step 1 and Step 2 of the reappraisal phase by computing the proportion of trials that participants were correct on Step 1 and Step 2 (no change), the proportion of trials that participants were incorrect on both Step 1 and Step 2 (no change), the proportion of trials that participants were incorrect on Step 1 and then were correct on Step 2 (improvement in performance), and the proportion of trials that participants were correct on Step 1 and then were incorrect on Step 2 (decline in performance). Additionally, we computed these values for overall performance and separately for performance when the target stayed the same distance, came closer, or moved farther away from Step 1 to Step 2. Table 3 shows these results. The results of a repeated measures ANOVA for each of the four proportions predicting accuracy revealed a significant effect, $F(3, 375) = 893.316$, $p < .001$. Follow-up tests demonstrated that participants were more likely to change their response from correct to incorrect ($M = .335$, $SD = .093$) than to change their response from incorrect to correct ($M = .055$, $SD =$

.066). Regardless of distance type, participants changed from a correct to incorrect response significantly more than they changed from an incorrect to a correct response, suggesting that the behavioral intervention of giving participants a second chance to evaluate their decision is not effective in improving shooting accuracy. Thus, Hypothesis 3, which predicted that participants would make more accurate decisions after situational reappraisal (that incorrect-correct would be more likely to occur than correct-incorrect) is not supported.

Moreover, we computed the proportion of trials that participants made the same response (correct-correct and incorrect-incorrect) and made a different response (correct-incorrect and incorrect-correct) in the reappraisal phase Step 2 compared to Step 1. We next compared the proportion of 'same response' and 'different response' by target movement: same distance in Step 2, closer distance in Step 2, and farther distance in Step 2. Three paired sample t-tests were conducted to compare the proportion of same responses versus different responses by target distance. The results showed a significant difference for all three target movement distances, $ps < .05$. The proportion of 'same' responses (correct-correct and incorrect-incorrect) responses was significantly higher than the proportion of different responses (correct-incorrect and incorrect-correct) for all three target distances (same, closer, and farther).

Table 3

Comparison of Accuracy between Step 1 and 2 of the Reappraisal Trials Overall and by Target Movement

	Correct-Correct	Incorrect-Incorrect	Correct-Incorrect	Incorrect-Correct
Overall	.560	.049	.335	.055
Same	.786	.039	.101	.062
Farther	.475	.045	.418	.052
Closer	.532	.058	.363	.048

In order to address Hypotheses 5a and 5b, a comparison of whether the proportion of ‘same’ responses differed between target movement trials was made. For this analysis, a repeated measures ANOVA was conducted with target movement (Same, Closer, Farther) as the predictor and proportion of ‘same’ responses as the dependent variable. A significant effect was observed, $F(2, 248) = 239.088$, $p < .001$, $\eta^2_p = .658$. Participants had a significantly greater proportion of ‘same’ responses in Step 1 and Step 2 on trials in which the target moved closer ($M = .590$, $SD = .094$) compared to when it moved farther away ($M = .520$, $SD = .117$). Thus, Hypothesis 5b is supported since participants would be more likely to have the ‘same’ response when an armed target approached than when the target retreated. However, participants made fewer ‘same’ responses on trials in which the target moved closer ($M = .590$, $SD = .094$) compared to when the target stayed the same distance ($M = .8240$, $SD = .133$). Participants also made fewer ‘same’ responses on trials in which the target moved farther away compared to trials that the target stayed the same distance. Thus, Hypothesis 5a is supported since there were less ‘same’ responses on trials in which the target moved compared to trials in which it stayed the same distance.

Additional analyses correlated individual differences in Neuroticism, Reappraisal Scores, and Suppression Scores with (1) proportion of Correct – Correct responses, (2) proportion of Incorrect-Incorrect responses, (3) proportion of Correct – Incorrect responses, and (4) proportion of Incorrect – Correct responses. These analyses were conducted to address Hypotheses 7a and 7b. No significant correlations were observed, *ps* > .05. Thus, Hypotheses 7a and 7b are not supported.

Model predicting accuracy for reappraisal (Step 2). In order to address Hypotheses 4, 6a, and 6b, a model predicting Accuracy in Step 2 of the reappraisal trials was created. The syntax for this model was: Step 2-Accuracy ~ Item*Race*Emotional Reappraisal*Target Movement + Item*Race*Emotional Suppression*Target Movement + Item*Race*Neuroticism*Target Movement + Accuracy_Step1 + Biological Sex + OSPAN + (1 | Participant). Target Movement was coded such that 0 was closer distance, 1 was same distance, and 2 was farther away. The results of the mixed effects logistic regression model revealed that Target Movement-Farther significantly predicted Accuracy (B = 1.048, $p < .001$). The three-way interaction Item X Reappraisal X Target Movement-Farther significantly predicted Accuracy (B = -0.010, p = .001); when the item was a gun and the target moved farther away, higher Reappraisal scores predicted higher shooting accuracy. The three-way interaction Race X Reappraisal X Target Movement-Farther significantly predicted Accuracy (B = 0.006, p = .029); when the target was White and the target moved farther away, individuals with higher Reappraisal scores were more likely to respond accurately. The results are represented in Table 4. The significant main effect of Target Movement-Farther supports Hypothesis 4, as participants were more accurate when the target moved farther away in comparison to when the target moved closer. The significance of the three-way interactions of Item X Reappraisal X Target Movement-Farther and Race X Reappraisal X Target Movement-Farther lend support to Hypothesis 6a. However, as all main effects and interactions including Neuroticism were not significant, Hypothesis 6b is not supported.

Table 4

Generalized Linear Mixed Effects Logistic Regression Predicting Accuracy for Step Two in Reappraisal Trials

Variable	B	SE	t	p(z)
(Intercept)	-0.085	0.082	-1.035	.301
Item	1.062**	0.091	11.631	.000
Race	0.030	0.089	0.337	.736
Reappraisal	0.001	0.002	0.354	.723
Target Movement-Farther	1.048**	0.089	11.713	.000
Target Movement-Same	0.949**	0.114	8.320	.000
Suppression	0.001	0.002	0.313	.754
Neuroticism	0.001	0.001	0.641	.521
Step1 Accuracy	-0.003	0.005	-0.566	.571
Sex	0.004	0.016	0.284	.776
OSPAN	0.001	0.000	1.560	.119
Item x Race	0.000	0.128	0.002	.998
Item x Reappraisal	-0.002	0.002	-0.750	.453
Race x Reappraisal	-0.001	0.002	-0.294	.769
Item x Target Movement-Same	-0.820**	0.156	-5.254	.000
Race x Target Movement-Farther	-0.178	0.127	-1.399	.162
Race x Target Movement-Same	-0.254	0.159	-1.592	.111
Reappraisal x Target Movement-Farther	-0.003	0.002	-1.332	.183
Reappraisal x Target Movement-Same	0.000	0.003	0.164	.870
Item x Suppression	0.000	0.002	-0.143	.887
Race x Suppression	-0.001	0.002	-0.484	.628
Target Movement-Farther x Suppression	0.000	0.002	-0.253	.800
Target Movement-Same x Suppression	-0.005*	0.002	-2.002	.045
Item x Neuroticism	-0.002	0.002	-1.035	.301
Race x Neuroticism	0.000	0.002	0.150	.881
Target Movement-Farther x Neuroticism	-0.002	0.002	-0.980	.327
Target Movement-Same x Neuroticism	-0.002	0.002	-1.073	.283
Item x Race x Reappraisal	0.000	0.003	-0.051	.960
Item x Race x Target Movement-Farther	0.085	0.181	0.469	.639
Item x Race x Target Movement-Same	-0.108	0.223	-0.483	.629
Item x Reappraisal x Target Movement-Farther	-0.010**	0.003	-3.407	.001
Item x Reappraisal x Target Movement-Same	-0.006	0.004	-1.517	.129
Race x Reappraisal x Target Movement-Farther	0.006*	0.003	2.183	.029
Race x Reappraisal x Target Movement-Same	0.003	0.004	0.687	.492
Item x Race x Suppression	-0.001	0.003	-0.196	.845
Item x Target Movement-Farther x Suppression	-0.003	0.003	-0.984	.325

Item x Target Movement-Same x Suppression	0.004	0.003	1.229	.219
Race x Target Movement-Farther x Suppression	0.000	0.003	0.072	.943
Race x Target Movement-Same x Suppression	0.004	0.003	1.335	.182
Item x Race x Neuroticism	0.000	0.002	0.117	.907
Item x Target Movement-Farther x Neuroticism	0.003	0.002	1.357	.175
Item x Target Movement-Same x Neuroticism	0.000	0.003	-0.113	.910
Race x Target Movement-Farther x Neuroticism	-0.001	0.002	-0.320	.749
Race x Target Movement-Same x Neuroticism	0.004	0.003	1.307	.191
Item x Race x Reappraisal x Target Movement-Farther	-0.004	0.004	-0.843	.399
Item x Race x Reappraisal x Target Movement-Same	0.007	0.005	1.269	.204
Item x Race x Target Movement-Farther x Suppression	0.001	0.004	0.319	.750
Item x Race x Target Movement-Same x Suppression	-0.004	0.005	-0.763	.446
Item x Race x Target Movement-Farther x Neuroticism	0.000	0.003	-0.037	.971
Item x Race x Target Movement-Same x Neuroticism	-0.001	0.004	-0.153	.879

Note. Race = Target Race; OSPAN is a measure of WMC.
*$p < .05$
**$p<.01$

Mixed Effects Linear Regressions

Three mixed effects linear regression analyses were conducted to examine the effect of biological sex, item, target race, WMC, coping strategies, and neuroticism on reaction time during each trial for the standard and reappraisal FPST. One model was used to predict Reaction Time during the standard trials, while two others were used to predict Reaction Time during the reappraisal trials (one for each step). Outliers that were more than 2.5 standard deviations above or below the mean Reaction Time were removed. Three outliers for Reaction Time were removed for the standard trials. The average reaction time for the standard trials was .67 (*SD* = .15), .75 (*SD* = .178) for Step 1 of the reappraisal trials, and .63 (*SD* = .34) for Step 2 of the reappraisal trials.

Model predicting reaction time for standard trials. To address Hypotheses 2a and 2b, a mixed effects linear regression model predicting Reaction Time in the standard trials was created. The syntax for the model was: RT ~ Item*Race* Emotional

Reappraisal + Item*Race* Emotional Suppression + Item*Race* Neuroticism + Biological Sex + OSPAN + (1 + Item*Race | Participant). The results for the regression are shown in Table 5. The results of the mixed effects linear regression model revealed that Item significantly predicted Reaction Time (B = -0.090, p = 0.003) as did the Item x Suppression interaction (B = 0.002, p = 0.012). The Item x Race x Suppression interaction was marginal in predicting Reaction Time (B = -0.001, p = 0.053). All other main effects and interactions were nonsignificant. Because of the significant main effect of Item, Hypothesis 2a is supported; participants were faster when shooting an armed target compared to an unarmed target (a target with a non-weapon). However, the Item X Race interaction was non-significant, thus there is no evidence to support Hypothesis 2b, in which it was predicted that participants would be faster to shoot a Black armed target.

Table 5

Generalized Linear Mixed Effects Regression Predicting Reaction Time for Standard Trials

Variable	B	SE	t	p(z)
(Intercept)	0.732	0.068	10.750	.000
Item	-0.090**	0.030	-2.963	.003
Race	-0.016	0.027	-0.603	.547
Reappraisal	0.000	0.001	0.207	.836
Suppression	-0.001	0.001	-0.680	.496
Neuroticism	0.000	0.001	0.322	.747
Sex	-0.016	0.017	-0.897	.370
OSPAN	0.000	0.001	-0.840	.401
Item x Race	0.018	0.038	0.467	.640
Item x Reappraisal	0.000	0.001	0.070	.944
Race x Reappraisal	0.000	0.001	-0.180	.857
Item x Suppression	0.002*	0.001	2.526	.012
Race x Suppression	0.001	0.001	0.983	.325
Item x Neuroticism	0.000	0.001	0.089	.929
Race x Neuroticism	0.001	0.001	0.983	.326
Item x Race x Reappraisal	0.000	0.001	0.457	.648

Item x Race x Suppression	-0.001	0.001	-1.934	.053
Item x Race x Neuroticism	0.000	0.001	-0.359	.720

Note. Race = Target Race; OSPAN is a measure of WMC.
**p* < .05
***p*<.01

Model predicting reaction time for reappraisal trials (Step 1). A mixed effects linear regression model predicting Reaction Time in the first step of the reappraisal trials was created. The syntax for the model was: RT ~ Item*Race* Emotional Reappraisal + Item*Race* Emotional Suppression + Item*Race* Neuroticism + Biological Sex + OSPAN + (1 | Participant). The results for the regression are shown in Table 6. All main effects and interactions were nonsignificant.

Table 6

Generalized Linear Mixed Effects Regression Predicting Reaction Time for First Step of Reappraisal Trials

Variable	B	SE	t	p(z)
(Intercept)	0.735	0.091	8.044	.000
Item	-0.055	0.04	-1.361	.173
Race	-0.051	0.035	-1.478	.14
Reappraisal	0.001	0.002	0.561	.575
Suppression	-0.001	0.002	-0.328	.743
Neuroticism	0.002	0.002	1.105	.269
Sex	-0.012	0.022	-0.559	.576
OSPAN	0	0.001	-0.479	.632
Item x Race	0.055	0.049	1.135	.256
Item x Reappraisal	-0.001	0.001	-0.869	.385
Race x Reappraisal	0.001	0.001	1.187	.235
Item x Suppression	0	0.001	-0.117	.906
Race x Suppression	0.001	0.001	0.761	.447
Item x Neuroticism	0	0.001	0.555	.579
Race x Neuroticism	0	0.001	0.638	.523
Item x Race x Reappraisal	-0.001	0.001	-0.703	.482
Item x Race x Suppression	-0.001	0.001	-0.597	.551
Item x Race x Neuroticism	-0.001	0.001	-0.819	.413

Note. Race = Target Race; OSPAN is a measure of WMC.

Model predicting reaction time for reappraisal trials (Step 2). A mixed effects linear regression model predicting Reaction Time in the second step of the reappraisal trials was created. The syntax for the model was: RT ~ Item*Race* Emotional Reappraisal + Item*Race* Emotional Suppression + Item*Race* Neuroticism + Biological Sex + OSPAN + (1 | Participant). The results of the regression are shown in Table 7. Item significantly predicted Reaction Time (*B* = -0.121, *p* = 0.007) while all other main effects and interactions were nonsignificant.

Table 7

Generalized Linear Mixed Effects Regression Predicting Reaction Time for Second Step of Reappraisal Trials

Variable	B	SE	t	p(z)
(Intercept)	0.634	0.1	6.311	.000
Item	-0.121**	0.044	-2.717	.007
Race	-0.051	0.046	-1.101	.271
Reappraisal	-0.001	0.002	-0.387	.699
Suppression	-0.001	0.002	-0.659	.51
Neuroticism	0.002	0.002	1.091	.275
Sex	-0.027	0.023	-1.158	.247
OSPAN	0.000	0.001	0.31	.757
Item x Race	0.072	0.062	1.164	.244
Item x Reappraisal	0.002	0.001	1.786	.074
Race x Reappraisal	0.002	0.001	1.441	.15
Item x Suppression	0.000	0.001	-0.387	.699
Race x Suppression	-0.001	0.001	-0.787	.431
Item x Neuroticism	0.001	0.001	1.582	.114
Race x Neuroticism	0.000	0.001	0.393	.694
Item x Race x Reappraisal	-0.002	0.001	-1.374	.169
Item x Race x Suppression	0.001	0.001	0.841	.400
Item x Race x Neuroticism	-0.001	0.001	-0.608	.543

Note. Race = Target Race; OSPAN is a measure of WMC.
*$p < .05$
**$p<.01$

Supplemental Analyses Comparing Hits, Misses, Correct Rejections, and False Alarms

SDT states that when an individual is making a decision, he or she is faced with both a signal (or target stimulus) and background noise (Green & Swets, 1966). SDT can be applied when individuals need to make decisions that compare the presence or absence of a target. Participants can respond with a hit in which the target is present and a decision or response is made, a miss in which the target is present and a response is absent, a false alarm in which the target is absent but a response is made, and a correct rejection in which the target and response are both absent. A sensitivity index of discriminating between the target signal and noise can be assessed by computing *d'*, which represents the z-scored proportion of hits minus the z-scored proportion of false alarms: *d*' = z(H) – z(F) where H = hits and F = false alarms. Higher *d*' values indicate that a participant is more sensitive in discriminating between when the target signal is present and when it is absent, and hit rates are greater than false alarm rates.

Hit Shot shooter	Miss Got Shot
False Alarm Shot Civilian	Correct Rejection Helped Civilian

Figure 3A. SDT and decisions for standard trials and step 1 of reappraisal trials.

Hit Shot Shooter Shot Ambusher	Miss Got Shot Got Ambushed
False Alarm Shot Civilian	Correct Rejection Helped Civilian Did Not Shoot Ally

Figure 3B. SDT and decisions for step 2 of reappraisal trials.

We examined the proportion of hits, misses, false alarms, correct rejections, and *d*' prime in the standard phase and Step 1 of the reappraisal phase. Because performance in Step 2 of the reappraisal phase changed depending on whether the target moved or stayed in the same position, the proportion in Step 2 has a different meaning than it does in Step 1; thus, we did not examine these rates in Step 2 (see Figure 3).

To examine hits, misses, false alarms, correct rejections, and *d*' between the standard and reappraisal phase, paired samples t-tests were conducted for each of these variables. Results indicated that rates of correct rejection were higher in the standard phase ($M = .452$, $SD = .062$) than in the reappraisal phase ($M = .431$, $SD = .082$), $t(125) = 2.166$, $p = .032$. False alarm rates were also higher in the standard phase ($M = .0457$, $SD = .044$) than in the reappraisal phase ($M = .024$, $SD = .044$), $t(125) = 3.979$, $p < .001$. Additionally, the *d*' sensitivity index was higher in the standard phase ($M = .216$, $SD = 1.348$) than in the reappraisal phase ($M = .117$, $SD = 1.831$), $t(125) = 2.211$, $p = .029$. There were no significant differences in hits ($p = .401$) or misses ($p = .680$) individually between conditions, however.

Correlations between the predictors and SDT outcome measures were also conducted. There was no significant correlation between the individual difference variables (Neuroticism, Suppression, and Reappraisal) and hits, misses, false alarms, correct rejections, or d' prime in the standard phase or in the reappraisal phase, *p*s > .15.

DISCUSSION

The purpose of this study was to investigate the influence of individual differences in neuroticism and coping strategies on action-based decision-making. This objective was examined using a shooting simulation task in which participants had to decide whether or not a target was innocuous; threatening targets were to be shot while innocuous targets were to be helped. It was predicted that in the standard phase, individuals would be less accurate in shooting a target than in phase two of the reappraisal trials, and Black targets would be more likely to be treated as a threat. In the second phase, it was anticipated that an unarmed target that moved closer would be more likely to be shot, an unarmed target that moved farther away would be less likely to be shot, and a target moving during reappraisal trials would lead to a different decision for the second step of the trial except in the case of a target with a weapon moving closer, which would lead to the same response. Additionally, it was predicted that individuals that are higher in emotion reappraisal would have more accurate responses, and those high in neuroticism would make less accurate responses.

Based on the findings, the hypotheses (*Hypotheses 1a* and *2b*) that accuracy would be lower for Black targets holding non-weapon items than White targets, and participants would shoot an armed target faster if he was Black were not supported. Thus, there was no evidence that target race alone is a factor in the accuracy of a shooting decision in our sample. In addition to the race of the target, item type was examined as a predictor of performance. As predicted, when the item was a gun, participants reacted faster (*Hypothesis 2a*) in standard trials and the second step of the reappraisal trials. However, in the standard trials, participants were not more likely to shoot when the target was holding a gun, not lending support to our hypothesis (*Hypothesis 1b*).

In addition to the effect of perceivable aspects of the stimuli (i.e., race and item type) on performance, individual differences in personality and coping strategies were explored as a potential influence on decision to shoot. Participants that had strong reappraisal coping skills made more accurate shooting decisions (*Hypothesis 6a*) when the item was a gun in the standard trials. However, participants reacted slower to an armed target if they scored high in Suppression, indicative of poorer coping strategy, in standard trials. In contrast to the influence of coping style, the personality trait neuroticism did not predict accuracy in shooting decision, contrary to what was predicted (*Hypothesis 6b*). These results suggest that coping style, but not personality-based coping tendencies, has a significant influence on shooting decisions. In addition to accuracy and reaction time, the impact of individual differences on the decision to make the same or different response after reappraisal was examined. The predictions that scoring high in Reappraisal would be associated with a tendency to keep responses the same *(Hypothesis 7a)* and scoring high in neuroticism would be associated with making different responses during the reappraisal period *(Hypothesis 7b)* were not supported.

In addition to the influence of individual differences, the impact of the opportunity for reappraisal on decision was examined. The hypothesis that participants would be more accurate in shooting decisions after reappraisal was not supported (*Hypothesis 3*). Instead, participants were more likely to make an incorrect decision after reappraisal. An additional aspect explored in the reappraisal trials was the effect of target movement on response. It was demonstrated that participants were less accurate in their response when the target came closer. Participants were more accurate in responding when the target moved farther away (*Hypothesis 4*), but only if they scored high in Reappraisal and the item was a gun or the target was White. Overall, as predicted, having the opportunity to reappraise the situation resulted in a change in decision if the target moved closer or farther away as compared to the target staying the same distance (*Hypothesis 5a)*. The prediction that participants will be more likely to have the same response during reappraisal when a target holding a weapon moves closer *(Hypothesis 5b)* was supported as there was a greater proportion of 'same' responses when the target moved closer than when the target moved farther away.

Based on this research, it can be concluded that while reappraisal as an opportunity or situational intervention does not lead to more accurate decisions, high 'self' reappraisal as a general coping mechanism does make an accurate decision more likely. Once an individual is in a threatening situation, having an opportunity to reappraise one's decision as the target moves does not improve decision accuracy, perhaps because the threat-related stress response has already begun. It is possible that once a negative physiological response was initiated in the first step of the task, it could not be overcome by simply providing time to re-evaluate the situation.

However, it appears that individuals who already utilize reappraisal as a coping strategy may approach a threatening situation like the shooting scenario in this study with an effective mindset. In contrast, a person that engages in suppression as a coping strategy is more likely to approach such a situation in a threatened mindset. These findings are consistent with prior work showing that situational and self-focused reappraisal can exert distinctive effects on cognitive performance and emotional reactions

(Willroth & Hilmire, 2016). Operationally, situational reappraisal entails reinterpreting an emotionally charged stimulus or situation, while self-focused reappraisal refers to differences in emotional perspective taking that a person approaches a situation with (Webb, Miles, & Sheeran, 2012). Furthermore, self- and situational reappraisal rely on distinctive brain regions; self-focused reappraisal relies on medial prefrontal brain regions that play a role in internal information processing, and situation-focused reappraisal relies on lateral prefrontal brain regions that play more of a role in external information processing (Ochsner et al., 2004). The findings of the present study extend this work on the distinction between self- and situational reappraisal to the domain of shooting performance. Collectively, these findings suggest that the individual has a fair amount of control over the coping strategy that influences performance accuracy in a high-threat situation.

Overall, it appears that the mindset a person is in before they approach a potentially threatening situation, such as a shooting scenario, has a greater impact on decision accuracy than trait coping or giving a person an opportunity to re-evaluate the situation. The implication of mindset being a determinant of accurate performance is that individuals that face potentially threatening situations regularly can be trained to use effective coping mechanisms. Since the opportunity for re-evaluation does not improve decision accuracy, the amount of time someone has to analyze a situation is not what significantly matters. Instead, it is important to make sure that individuals entering high-threat or other high-stakes situations regularly reappraise situations so that they can approach the situations they are exposed to with an adaptive mindset.

In addition to coping strategy, race of the target and the presence of a gun influence decision accuracy. This perceptive influence means that it is important to know what individuals in dangerous situations consider threatening. By understanding what is considered most threatening, efforts can be made in training (and perhaps in instituting change at a societal level) to challenge any perceived threats that are prejudicial biases (e.g. race). Another related perceptive influence is whether a change in the behavior of a stimulus affects decision-making. This research demonstrates that having a target move is associated with a change from an original decision. Once the stimulus is perceived as being different from how it was originally perceived, the threat level of the stimulus can also change. Thus, if an individual is faced with a stimulus it can go from being a threat to a non-threat and vice versa depending on the stimulus' behavior. The lack of predictability of a stimulus further demonstrates the importance of facing a situation with an adaptive mindset.

The issues relating to perception regarding the nature of a stimulus, such as that of race and the presence of a weapon, are influenced by emotion. Based on the affect-as-information hypothesis, the emotion invoked by a stimulus can convey motivating information about the situation the perceiver is faced with (Schwarz & Clore, 1983). For instance, the presence of a gun can invoke negative, high arousal emotion such as fear causing the perceiver to be threatened and thus be motivated to defend himself or herself. Our finding that participants were not more likely to shoot an armed target contradicts this hypothesis. However, when coping strategy is added as a factor, having higher coping skills was associated with being more likely to shoot an armed target. As a further highlight of the influence emotion has on perception, according to the threat-signal hypothesis, a stimulus that is deemed threatening can be perceived as being closer than if it was considered a non-threat (Cole et al., 2013); additionally, a threatening stimulus can be perceived as moving faster (Witt & Sugovic, 2013). In line with this previous research, our finding that participants reacted faster when the target was armed suggests armed targets may have been perceived as moving faster. Our results also lend support for the threat-signal hypothesis since participants were more likely to respond correctly to targets that came closer compared to targets that moved farther away. In addition to the presence of a weapon, race was also predicted to have an influence on threat perception. In contrast to previous findings regarding shooter bias (Correll et al., 2002), Black targets overall were not shot more often or faster than White targets. However, our finding that high Reappraisal was associated with better accuracy in the decision to shoot only applied to situations in which the target was White and the target moved farther away. Reappraisal did not lead to better accuracy when the target was Black. The implication for these results suggests that coping strategies alone are not the ideal solution for preventing the misperception of threat, addressing racial bias is also important.

The results of the present study also relate to the risk-as-feelings hypothesis, which proposes that both emotion and risk evaluation can be used to make a decision (Loewenstein et al., 2001). In particular, the mindset someone has coming into an emotionally charged, risky situation can impact the decision made. The finding that participants were only more accurate when the target was armed if they scored high in Reappraisal demonstrates the importance of mindset. Thus, coping through self-reappraisal is an important factor in making an accurate decision. The shooting decision made can be framed in terms of whether or not the participant successfully engaged response inhibition (i.e. inhibited a conditioned fear response). Despite the influence of emotion, threat-related physiological arousal tends to have a stronger influence on response inhibition than the valence of the threat (Pessoa et al., 2012). Thus, if an individual is able to adaptively regulate his or her physiological response so as to experience less arousal, the individual may have more control over his or her conditioned response to the threat. This conclusion is supported by the finding that scoring high in Reappraisal had some influence on being more likely to respond accurately. Based on this finding, it is possible that when faced with a threatening situation, using reappraisal as a coping strategy may lead to a decrease in arousal, allowing the individual to overcome the impulse to use a fear-based response such as shooting.

Previous work shows that evaluation of a stimulus determines whether an individual will approach or avoid the stimulus (Elliot & Covington, 2001). In our results, participants with strong coping skills were less likely to approach (i.e. shoot) a target that moved farther away during the reappraisal trials when the target was White. This finding suggests that the presence of a White individual and movement away from the individual can cause a less negative evaluation of the situation. Overall, these results demonstrate that characteristics of a stimulus can influence whether it is deemed threatening and, in turn, the action an individual will take towards the stimulus.

According to protection motivation theory, an individual will be motivated to defend himself or herself when faced with a stimulus assessed as a threat (Floyd et al., 2000). This theory was not supported (when Item alone was considered) as our results demonstrate that armed targets were not more likely to be assessed as a threat. Just as the ability to protect oneself is important, so is the ability to cope in an ambiguously threatening situation. It is theorized that effective coping will lead to more positive emotion (Smith & Lazarus, 1990). This concept was supported by our results as individuals with strong self-reappraisal coping skills were more accurate in their response when the target was White or the item was a gun and the target moved away; when faced with a threatening task, such individuals were able to react with an adaptive response as they may have believed they could cope with the situation effectively.

In addition to individual differences in coping strategy, this study examined the influence of other individual difference factors, including neuroticism and WMC, on shooting performance. Since there is a link between neuroticism and negative coping (Hengartner et al., 2017) it was predicted that individuals higher in neuroticism would perform more poorly. However, our findings were not consistent with this prediction; neuroticism had no significant effect on shooting decision. Thus, unlike self-reappraisal, trait neuroticism does not influence shooting behavior. Another cognitive trait, WMC, was also predicted to have an influence on shooting performance as previous research has demonstrated that individuals with lower WMC are less accurate in shooting decisions (Brewer et al., 2016; Kleider & Parrott, 2009; Kleider et al., 2010); our findings showed no significant relationship between WMC and shooting behavior. In addition to psychological characteristics, we examined the physical characteristic of biological sex as a potential influence on shooting performance; previous research demonstrated that males are more likely to be involved in shootings (Donner et al., 2017). However, there was no significant relationship between biological sex and shooting performance in our findings. Overall, from the lack of support of our predictions, we can conclude that ingrained individual differences are not as significant contributors to action-based decisions as more mutable characteristics such as self-reappraisal. The implication of these findings is that performance in high-stakes situations, including those involving shooting decisions, could potentially be improved through training in self-reappraisal coping skills.

Limitations

There are limitations in this study concerning demographics. It is possible that the participant’s race might have an influence on whether or not a particular target is shot. For instance, a Black participant may be less likely to shoot a Black target than a White participant would. This possibility may be due to identifying the target as a member of an ingroup versus outgroup. If a participant uses System 1 cognition when determining the threat level of the target, the decision will be made automatically and be based on past experiences with or held stereotypes of individuals that are the same race as the target. In contrast, if the participant uses System 2 cognition then slower processing involving reasoning will be used in making the decision (Tay, Ryan, & Ryan, 2016). In the situation presented by the task (trying to make a decision in a short period of time), it is easier to rely on System 1 rather than System 2 processing. Thus, participants may be more likely to use the associations they have with particular races and whether they and the target are the same race to decide whether the target is a threat. In the current study it is possible that there was some bias against shooting White targets because 80% of the participants were White. However, it is possible that participant race has no significant influence on perceived threat based on target race, as it has been demonstrated that participant ethnicity has no significant influence on whether a participant exhibits shooter bias (Correll et al., 2002).

Another limitation relating to demographics is convenience sampling and the number of females. Participants were university students and overwhelmingly female (79%). Having such a skewed sample in terms of biological sex may have impacted the results. Particularly, we may not have detected a significant effect of biological sex predicting performance, with males performing worse than females, because we did not have enough males. Thus, there are limitations to generalizing our findings to the broader population.

Future Directions

Future research can take a different approach to the statistical analyses. Performance in Step 2 of the reappraisal trials varied as a function of whether the target stayed in the same position or moved; thus *d'* would not mean the same in Step 2 as it does in Step 1. In order to compare *d'* between Step 1 and Step 2 in the reappraisal trials, accuracy rates in Step 2 would need to be transformed. Another statistical change that can be incorporated involves the variable Neuroticism. Since the models that included Neuroticism were not significant, future research can examine reduced models without Neuroticism. Outside of statistical implications, it is possible that measuring amygdala activity or using some other measure of emotional reactivity like heart rate variability, rather than using Neuroticism, may have yielded positive results. Such measures may be more sensitive to emotional reactivity to threat, which we were trying to operationalize in our study. Thus, future research could use more sensitive measures for emotional reactivity.

Another new approach for future research is looking at core self-evaluation (CSE) as a variable. CSE is an assessment that individuals make about themselves that consists of assessing their capabilities, competence, and positive outlook on life. It is a concept that combines the traits of self-esteem, self-efficacy, locus of control, and low neuroticism. Research has shown that these four traits are moderately related to each other and that they load on a common factor. Additionally, there is evidence that CSE predicts outcomes such as stress better than the four traits individually (Judge, 2009). It is possible that being high in CSE will be associated with making less errors in high-stakes, threatening situations. Another way individual differences can be further explored in the future is in observing whether there are any interactions between WMC, Neuroticism (or CSE), and coping strategies (Reappraisal and Suppression). Since both WMC and emotion have an influence on behavior, it would be beneficial to investigate their combined effects.

Future research could also further explore the issue of race in shooting decisions by using eye tracking to compare where participants look when the target is Black versus when the target is White. Another perception issue is how variation in the presentation of the targets and backgrounds could alter the ability to detect a weapon. A source of variation was the various types of non-weapons that could appear in a target's hand. Although there's no previous research about the differences in difficulty of distinguishing different types of objects from guns, future research can explore whether certain items are perceived as more similar in appearance to guns, especially under time pressure. Additionally, there are 20 different backgrounds, a few of which are presented behind a target in a single trial. Although these backgrounds are designed to make the task more realistic, due to differences in contrast between the different backgrounds and items, the difficulty of determining whether a particular item is a weapon could potentially vary as a function of the background presented at the end of the trial. Other potential influences on object detection are posture of the target and clothing. In addition to the potential issue of object detection is the possibility of participants being more likely to perceive an object as a weapon due to a higher sense of threat associated with certain backgrounds and clothing. Thus, usability and perceptual studies should be conducted on this task to determine the effect of different backgrounds, target position, object type, and clothing on performance.

CONCLUSION

Situational factors and individual differences are important factors to consider in action-based decision-making contexts, such as shooting a target. Regarding situational factors, the results of this study show that the presence of a gun does not predict shooting accuracy. Thus, further research about weapon detection should be conducted to better understand how the presence or absence of a weapon influences shooting decision accuracy. Furthermore, this study did not find evidence that race significantly predicts shooting accuracy –except if the target is White and moves away– which does not support the concept of shooter bias. Thus, the relationship between race and shooting decision should be investigated further to determine if there are any contributing factors besides race in the shooter bias phenomenon. Furthermore, individual differences in biological sex, WMC, and neuroticism did not predict shooting performance in this study. Given that prior research has found associations between WMC and biological sex on shooting behavior, further research should be conducted to elucidate the nuances of these relationships.

In this study, reappraisal was examined as both a situational (situational reappraisal) and individual difference (self-reappraisal) factor in action-based decision-making. Regarding the former, in high-stakes, high-threat situations in which decisions must be made quickly, it may seem that having a second chance to evaluate a decision would increase the likelihood of making a correct decision. However, having a situational reappraisal period did not lead to more accurate action-based decision-making in the present study. Individual differences in coping style on the other hand, have a significant influence on decision accuracy. Specifically, high self-reappraisal coping strategies are associated with more accurate action-based decision-making in simulated shooting scenarios. Overall, a promising way to increase the chances of an accurate action-based decision in a high-stakes situation is to ensure that the individual making the decision has very strong coping skills.

APPENDICES

APPENDIX A: Standard FPST Instructions

Standard FPST Practice Trials Instructions

In this experiment, your task is to shoot any person holding a gun by pressing the L key. If a person is holding something other than a gun, you should press the A key to help him.

You will have less than a second to make each decision.
You will receive points based on your performance. At the end of the task, you will receive 1 dollar for every 100 points you earn.

We will start with a few practice trials.

PRESS SPACE TO CONTINUE

Standard Trials Instructions

You have finished the practice phase.
The test phase of the experiment is longer.
Please try to stay focused throughout the task.
Doing so will allow us to more accurately gauge your performance.

Reminder: press L to shoot and A to help.

Please tell the experimenter if you have any questions.

PRESS THE SPACE BAR TO CONTINUE.

APPENDIX B: Reappraisal FPST Instructions

THE TASK HAS CHANGED!
PLEASE READ THESE INSTRUCTIONS CAREFULLY!

In this next part of the experiment, you will see two phases. The first phase is the same as you have done--shoot the guys who have a gun and help the guys who don't have a gun.
In the second phase, however, the guy you just shot or helped will appear again. So, you will see the same guy again immediately after your first action. If that guy gets closer, you must shoot him. If the guy gets farther away the second time you see him, you must help him. If the guy stays the same distance, shoot him if he has a gun (press L) and help him if he does not have a gun (press A).

You will not be given feedback for your first response; you only receive feedback based on your performance in the second phase, when the guy gets closer, farther away, or stays the same distance.

Please take some time to make sure you understand these instructions. Ask the experimenter if you have any questions.

PRESS THE SPACE BAR TO CONTINUE.

REFERENCES

Akinola, M., & Mendes, W. B. (2012). Stress-induced cortisol facilitates threat-related decision making among police officers. *Behavioral Neuroscience*, *126*(1), 167-174. https://doi.org/10.1037/a0026657

Anshel, M. H., Robertson, M., & Caputi, P. (1997). Sources of acute stress and their appraisals and reappraisals among Australian police as a function of previous experience. *Journal of Occupational And Organizational Psychology*, *70*(4), 337-356. https://doi.org/10.1111/j.2044-8325.1997.tb00653.x

Arnaudova, I., Krypotos, A., Effting, M., Kindt, M., & Beckers, T. (2017). Moving threat: Attention and distance change interact in threat responding. *Emotion*, *17*(2), 251-258. https://doi.org/10.1037/emo0000219

Blanchette, I., & Richards, A. (2010). The influence of affect on higher level cognition: A review of research on interpretation, judgement, decision making and reasoning. *Cognition & Emotion, 24*(4), 561-595. https://doi.org/10.1080/02699930903132496

Brewer, G. A., Hunter Ball, B., & Ware, J. M. (2016). Individual differences in working memory capacity and shooting behavior. *Journal of Applied Research in Memory and Cognition*, *5*(2), 185-191. https://doi.org/10.1016/j.jarmac.2016.04.004

Bublatzky, F., Alpers, G. W., & Pittig, A. (2017). From avoidance to approach: The influence of threat-of-shock on reward-based decision making. *Behaviour Research and Therapy*, *96*, 47-56. https://doi.org/10.1016/j.brat.2017.01.003

Cole, S., Balcetis, E., & Dunning, D. (2013). Affective signals of threat increase perceived proximity. *Psychological Science*, *24*, 34-40. https://doi.org/10.1177/0956797612446953

Correll, J., Hudson, S. M., Guillermo, S., & Ma, D. S. (2014). The police officer's dilemma: A decade of research on racial bias in the decision to shoot. *Social and Personality Psychology Compass*, *8*(5), 201-213. https://doi.org/10.1111/spc3.12099

Correll, J., Park, B., Judd, C. M., & Wittenbrink, B. (2002). The police officer’s dilemma: Using ethnicity to disambiguate potentially threatening individuals. *Journal of Personality and Social Psychology, 83*, 1314–1329. https://doi.org/10.1037/0022-3514.83.6.1314

Correll, J., Urland, G. R., & Ito, T. A. (2006). Event-related potentials and the decision to shoot: The role of threat perception and cognitive control. *Journal of Experimental Social Psychology*, *42*(1), 120-128. https://doi.org/10.1016/j.jesp.2005.02.006

Constans, J. I. (2001). Worry propensity and the perception of risk. *Behaviour Research and Therapy, 39*, 721-729. https://doi.org/10.1016/S0005-7967(00)00037-1

Craske, M. G., Waters, A. M., Nazarian, M., Mineka, S., Zinbarg, R. E., Griffith, J. W., ... & Ornitz, E. M. (2009). Does neuroticism in adolescents moderate contextual and explicit threat cue modulation of the startle reflex? *Biological Psychiatry*, *65*(3), 220-226. https://doi.org/10.1016/j.biopsych.2008.07.020

Donner, C. M., Maskaly, J., Piquero, A. R., & Jennings, W. G. (2017). Quick on the draw: Assessing the relationship between low self-control and officer-involved police shootings. *Police Quarterly*, *20*(2), 213-234. https://doi.org/10.1177/1098611116688066

Elliot, A. J., & Covington, M. V. (2001). Approach and avoidance motivation. *Educational Psychology Review*, *13*(2), 73-92. http://dx.doi.org/10.1023/A:1009009018235

Elliot, A. J. (2006). The hierarchical model of approach-avoidance motivation. *Motivation and Emotion*, *30*(2), 111-116. https://doi.org/10.1007/s11031-006-9028-7

Floyd, D. L., Prentice-Dunn, S., & Rogers, R. W. (2000). A meta-analysis of research on protection motivation theory. *Journal of Applied Social Psychology*, *30*(2), 407-429. https://doi.org/10.1111/j.1559-1816.2000.tb02323.x

Gamble, K. R., Vettel, J. M., Patton, D. J., Eddy, M. D., Caroline Davis, F., Garcia, J. O., & ... Brooks, J. R. (2018). Different profiles of decision making and physiology under varying levels of stress in trained military personnel. *International Journal of Psychophysiology*, *131*, 73-80. https://doi.org/10.1016/j.ijpsycho.2018.03.017

Green, D. M., & Swets, J. A. (1966). *Signal detection theory and psychophysics.* New York, NY: Wiley.

Gross, J. J. (1998). Antecedent- and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. *Journal of Personality and Social Psychology, 74*, 224–237.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*(2), 348-362.

Hartikainen, K. M., Siiskonen, A. R., & Ogawa, K. H. (2012). Threat interferes with response inhibition. *Neuroreport: For Rapid Communication of Neuroscience Research*, *23*(7), 447-450. doi:10.1097/WNR.0b013e3283531e74

Hayden, G. A. (1981). Police discretion in the use of deadly force: An empirical study of information usage in deadly force decision making. *Journal of Police Science and Administration*, *9*(1), 102-107.

Hengartner, M. P., van der Linden, D., Bohleber, L., & von Wyl, A. (2017). Big Five Personality Traits and the General Factor of Personality as Moderators of Stress and Coping Reactions Following an Emergency Alarm on a Swiss University Campus, *Stress Health*, *33*, 35–44. https://doi.org/10.1002/smi.2671

Hogarth, R. M., Portell, M., Cuxart, A., & Kolev, G. I. (2011). Emotion and reason in everyday risk perception. *Journal of Behavioral Decision Making*, *24*, 202-222. https://doi.org/10.1002/bdm.689

Jamieson, J. P., Mendes, W. B., Blackstock, E., & Schmader, T. (2010). Turning the knots in your stomach into bows: Reappraising arousal improves performance on the GRE. *Journal of Experimental Social Psychology*, *46*, 208–212. https://doi.org/10.1016/j.jesp.2009.08.01

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). The Big Five Inventory--Versions 4a and 54. Berkeley: University of California, Berkeley, Institute of Personality and Social Research.

Johnson, E.J., & Tversky, A. (1983). Affect, generalization, and the perception of risk. *Journal of Personality and Social Psychology, 45,* 20-31. https://doi.org/10.1037/0022-3514.45.1.20

Judge, T. A. (2009). Core self-evaluations and work success. *Current Directions in Psychological Science*, *18*(1), 58–62. https://doi.org/10.1111/j.1467-8721.2009.01606.x

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica, 47*(2), 263-291. doi:10.2307/1914185

Kleider, H. M., & Parrott, D. J. (2009). Aggressive shooting behavior: How working memory and threat influence shoot decisions. *Journal of Research in Personality*, *43*(3), 494-497. https://doi.org/10.1016/j.jrp.2008.12.007

Kleider, H. M., Parrott, D. J., & King, T. Z. (2010). Shooting behaviour: How working memory and negative emotionality influence police officer shoot decisions. *Applied Cognitive Psychology*, *24*(5), 707–717. https://doi.org/10.1002/acp.1580

Lazarus, R. S. (2001). Relational meaning and discrete emotions. In K. R. Scherer, A. Schorr, T. Johnstone, K. R. Scherer, A. Schorr, T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, methods, research* (pp. 37-67). New York, NY, US: Oxford University Press.

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, *127*(2), 267-286. https://doi.org/10.1037/0033-2909.127.2.267

Lynn, S. K., & Barrett, L. F. (2014). "Utilizing" signal detection theory. *Psychological Science*, *25*(9), 1663-1673. https://doi.org/10.1177/0956797614541991

Matthews, G., Panganiban, A. R., & Hudlicka, E. (2011). Anxiety and selective attention to threat in tactical decision-making. *Personality and Individual Differences*, *50*(7), 949-954. https://doi.org/10.1016/j.paid.2010.09.005

Nieuwenhuys, A., Savelsbergh, G. P., & Oudejans, R. D. (2015). Persistence of threat-induced errors in police officers' shooting decisions. *Applied Ergonomics*, *48,* 263-272. https://doi.org/10.1016/j.apergo.2014.12.006

Ochsner, K. N., Ray, R. D., Cooper, J. C., Robertson, E. R., Chopra, S.,Gabrieli, J. D., & Gross, J. J. (2004). For better or for worse: Neural systems supporting the cognitive down- and up-regulation of negative emotion. *NeuroImage*, *23*, 483–499. http://dx.doi.org/10.1016/j.neuroimage.2004.06.030

Perkins, A. M., Cooper, A., Abdelall, M., Smillie, L. D., & Corr, P. J. (2010). Personality and defensive reactions: fear, trait anxiety, and threat magnification. *Journal of Personality*, *78*(3), 1071-1090. https://doi.org/10.1111/j.1467-6494.2010.00643.x

Pessoa, L., Padmala, S., Kenzer, A., & Bauer, A. (2012). Interactions between cognition and emotion during response inhibition. *Emotion, 12*, 192-197. https://doi.org/10.1037/a0024109

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology*, *91*(1), 93-114. https://doi.org/10.1080/00223980.1975.9915803

Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39*, 1161–1178. https://doi.org/10.1037/h0077714

Schwarz, N., & Clore, G.L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology, 45*, 513–523. https://doi.org/10.1037/0022-3514.45.3.513

Smith, C. A., & Lazarus, R. S. (1990). Emotion and adaptation. In L. A. Pervin (Ed.), *Handbook of personality: Theory and research* (pp.609-637). New York, NY : Guilford Press.

Tamir, M., & Robinson, M. D. (2007). The happy spotlight: Positive mood and selective attention to rewarding information. *Personality and Social Psychology Bulletin*, *33*, 1124-1136. https://doi.org/10.1177/0146167207301030

Tay, S. W., Ryan, P., & Ryan, C. A. (2016). Systems 1 and 2 thinking processes and cognitive reflection testing in medical students. *Canadian Medical Education Journal*, *7*(2), e97–e103. https://doi.org/10.36834/cmej.36777

Turner, M. L., & Engle, R. W. (1989). Is working memory capacity task dependent? *Journal of Memory & Language*, *28*, 127–154. https://doi.org/10.1016/0749-596X(89)90040-5

Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, *5*(4), 297-323. https://doi.org/10.1007/BF00122574

van Ulzen, N. R., Semin, G. R., Oudejans, R. R. D., & Beek, P. J. (2008). Affective stimulus properties influence size perception and the Ebbinghaus illusion. *Psychological Research, 72,* 304–310. https://doi.org/10.1007/s00426-007-0114-6

Webb, T. L., Miles, E., & Sheeran, P. (2012). Dealing with feeling: A meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. *Psychological Bulletin*, *138*, 775–808. http://dx.doi.org/10.1037/a0027600

Willroth, E. C., & Hilimire, M. R. (2016). Differential effects of self-and situation-focused reappraisal. *Emotion*, *16*(4), 468-474. https://doi.org/10.1037/emo0000139

Witt, J. K., & Sugovic, M. (2013). Spiders appear to move faster than non-threatening objects regardless of one's ability to block them. *Acta Psychologica, 143(3)*, 284-291. https://doi.org/10.1016/j.actpsy.2013.04.011

Zelenski, J. M., & Larsen, R. J. (2002). Predicting the future: How affect-related personality traits influence likelihood judgments of future events. *Personality and Social Psychology Bulletin, 28*, 1000-1010. https://doi.org/10.1177/014616720202800712